www.ijonses.net

Digital-Based Learning Media Innovation: Improving Motivation and Science Learning Outcomes

Aan Nurhasanah
Kuningan University, Indonesia

Eko Handoyo
Universitas Negeri Semarang, Indonesia

Arif Widiyatmoko
Universitas Negeri Semarang, Indonesia

Rusdarti Rusdarti
Universitas Negeri Semarang, Indonesia

To cite this article:

Nurhasanah, A., Handoyo, E., Widiyatmoko, A., & Rusdarti, R. (2025). Digital-based learning media innovation: Improving motivation and science learning outcomes. *International Journal on Social and Education Sciences (IJonSES)*, *7*(2), 185-194. https://doi.org/10.46328/ijonses.723

International Journal on Social and Education Sciences
2025, Vol. 7, No. 2, 185-194 https://doi.org/10.46328/ijonses.723

Digital-Based Learning Media Innovation: Improving Motivation and Science Learning Outcomes

Aan Nurhasanah, Eko Handoyo, Arif Widiyatmoko, Rusdarti Rusdarti

Article Info

Article History

Received:
8 December 2024
Accepted:
28 March 2025

Keywords

Media digital learning
Motivation
Learning outcomes
IPAS
Qualitative

Abstract

This study aims to explore the effectiveness of digital-based learning media innovation in improving students' motivation and learning outcomes in Natural and Social Sciences (IPAS) subjects at elementary school level. The research approach used is qualitative with a case study method on fifth grade students at an elementary school in Indonesia. Data were obtained through observation, in-depth interviews, and analysis of relevant documents. The results of the study indicate that the use of digital-based learning media, such as interactive applications and learning videos, can increase students' enthusiasm in the learning process. Students show higher motivation, characterized by active involvement and positive responses during learning. In addition, student learning outcomes also increase, both in terms of understanding concepts and the ability to apply the material. Supporting factors for the success of digital media implementation include technology accessibility, teacher training, and the suitability of the material to the curriculum. This study concludes that digital-based learning media innovation not only facilitates more interesting learning but also contributes significantly to increasing student motivation and learning outcomes. This study recommends further development of child-friendly digital media designs and improving technology infrastructure in elementary schools.

Introduction

Education is the main foundation in producing a generation that is intelligent, creative, and ready to face various challenges in the future. In the digital era, the integration of technology in teaching and learning activities can no longer be avoided. Technology provides a great opportunity to create learning media that are more attractive, interactive, and relevant to the needs of 21st century students. Especially in learning Natural and Social Sciences (IPAS) at the elementary school level, technology can be utilized to overcome various obstacles that have often arisen.(Fatmasari et al., 2024)

One of the main problems in learning science is low student motivation. Many students find science material difficult and less interesting, so they tend to be less actively involved in the learning process. This condition has an impact on inadequate learning outcomes. Conventional learning methods, such as lectures or assignments without the support of interactive media, are still often used even though they are less appropriate to the learning

needs of students in the modern era. In addition, student learning outcomes in science subjects are often below the expected standard, indicating a gap between teaching methods and student needs. (Siswa et al., 2024) This traditional approach is often less effective in helping students understand the complex concepts of science and natural sciences. Advances in digital technology present a great opportunity to improve the quality of learning through the development of digital-based learning media. This media allows the presentation of science and natural sciences materials in a more interesting, interactive, and easy-to-understand way. The interactive features in digital media can also increase student engagement during the teaching and learning process.(F. F. K. Sari & Atmojo, 2021)

Thus, the development of digital-based learning media becomes a strategic solution to answer these challenges. The integration of technology into science and science learning is expected to encourage students' learning motivation while iproving their learning outcomes. (Fitria, 2014) This research is based on the urgent need to develop learning media that can connect teaching approaches with technological advances while meeting the needs of students in the modern era..Science learning in elementary schools plays an important role in building students' understanding of the relationship between the natural and social environment. However, the learning process often faces various challenges, such as low student learning motivation. Science material is often considered uninteresting, too abstract, or difficult to understand. This is generally caused by the use of traditional learning methods that lack innovation and involve less interactive elements, so they fail to attract students' attention. (Suhelayanti,.2023).

Learning in elementary schools is currently still dominated by traditional methods such as lectures and the use of printed media, especially textbooks, as the main source. This approach is less relevant to the needs of students in the digital era, who are more accustomed to technological devices and multimedia applications. The mismatch between conventional teaching methods and the learning styles of students in the digital era often causes boredom, low motivation, and passive attitudes during the learning process. As a result, student learning outcomes in Natural and Social Sciences (IPAS) subjects often do not reach the desired standards. Data and reports show that students' understanding of IPAS concepts is still low, indicating a gap between learning objectives and actual results obtained.(Wiliyanti et al., 2024). The lack of innovation in the application of digital technology to learning media is one of the factors that worsens this situation. In fact, digital technology-based learning media has been proven effective in increasing motivation and learning outcomes in various educational contexts. However, the adoption of technology in science and natural sciences learning is still limited, which is caused by limited resources, lack of teacher training, and low awareness of the benefits of using technology. Therefore, this study aims to examine how digital-based learning media can improve student motivation and learning outcomes in science and natural sciences subjects. In addition, this study also focuses on the development of innovative, relevant, and interactive digital learning media, so that it can make learning more interesting and effective. The media developed is expected to be able to convey science and natural sciences material visually and interactively to make it easier for students to understand the concepts taught.(Maria Hermina Nona Lora, Sudarwati Nababan, Sukarman Hadi Jaya Putra, 2024).

The purpose of this study is in line with the vision of 21st century education, which emphasizes the importance

of technology integration in learning to create meaningful learning experiences. In addition to improving the quality of science and science learning, this study also aims to develop students' digital competence from an early age. The results of this study are expected to be a guide for teachers and educational institutions in adopting digital learning media. By carrying out technology-based innovation, this study offers learning solutions that are adaptive to the development of the times and are able to improve the learning experience of elementary school students.(Khomsinuddin et al., 2024)

Various previous studies have explored science learning, especially related to efforts to improve student motivation and learning outcomes. However, research on the use of digital technology in science learning in elementary schools is still very limited. Many studies only focus on technical aspects, such as application or software design, without considering the specific needs of elementary school students. In addition, most studies of educational technology are more focused on subjects such as mathematics or language, while studies related to science are relatively few. This emphasizes the need for more in-depth research on the design of digital learning media that can effectively support science learning.Another gap that is seen is the lack of attention to the influence of digital media on students' learning motivation. In fact, motivation is one of the important factors in educational success. Unfortunately, motivation is often considered a secondary outcome compared to cognitive learning outcomes. Strong motivation can actually encourage students' active involvement and improve their understanding of the subject matter. In addition, many digital learning media are designed for advanced students, while elementary school students need a more visual, interactive, and simple approach. To answer this challenge, this study offers a new approach by developing digital learning media specifically designed to improve the motivation and learning outcomes of science students. This media will combine visual, audio, and animation elements to create an interesting and meaningful learning experience.(Wijaya et al., 2023)

The development of learning media in this study is adjusted to the needs of elementary school students, emphasizing attractive visualizations, easily accessible interactive features, and emotionally relevant presentation of materials. Most previous studies have applied technology to exact subjects, while this study focuses on science, by integrating natural and social concepts. In this context, the increasing use of digital devices by elementary school students provides an opportunity to apply a learning approach that is relevant to their lifestyle. Science subjects, which play an important role in building students' understanding of the world around them, often face obstacles in conveying abstract and complex materials. Therefore, the development of innovative digital learning media is expected to bridge this gap and improve the quality of science learning in elementary schools.(Ummah, 2019).

With the development of digital technology, elementary school students are increasingly familiar with digital devices in their daily lives. This study answers the need for a learning approach that is appropriate to the digital-native environment of students, while utilizing the potential of technology to improve the quality of education. Science subjects have a strategic role in building students' understanding of the world around them. However, the challenges in delivering abstract and complex materials often make learning less effective. The development of innovative digital-based media can be a solution to bridge this gap

Method

The research approach used in this study is a qualitative approach. The qualitative approach was chosen because the main objective of this study is to understand the deeper and more in-depth phenomenon of the use of digital-based learning media in the context of Natural and Social Sciences (IPAS) learning at the elementary school level. The qualitative approach allows researchers to explore information about students' subjective experiences, teachers' perceptions, and students' interactions with digital media in the learning environment.(Assyakurrohim et al., 2022).

This study uses a qualitative descriptive research type, which aims to describe and analyze the phenomenon of the use of digital-based learning media in learning Natural and Social Sciences (IPAS) at the elementary school level (SD), as well as to explore how this media can affect student motivation and learning outcomes. This study emphasizes more on understanding and explaining the influence of digital media on the learning process naturally, without any manipulation of variables or experimental control. The type of qualitative descriptive research was chosen because this study aims to explore the experiences of research subjects (students and teachers) in a natural and real context in the classroom.(Dewi et al., 2024) The subjects in this study consist of two main groups that will provide comprehensive insights regarding the use of digital-based learning media: Elementary School Students Taking Science Learning. This study will involve a number of students enrolled in science classes in several elementary schools that have implemented digital-based learning media. Specifically, the students who are the subjects of this study are students in grades 4 to 6 of elementary school, who are generally between 9 and 12 years old. This study will also involve science teachers who are directly involved in the teaching process using digital-based learning media. These teachers come from various elementary schools that have implemented technology in their learning, and have experience in integrating digital media into the science curriculum.

Data collection techniques used in this study. In-depth interviews are one of the main techniques used to obtain qualitative data that is in-depth and exploratory. This interview aims to explore the understanding and perceptions of teachers and students regarding the use of digital-based learning media in the classroom. Classroom observations are conducted to gain a direct understanding of how digital-based learning media is applied in the teaching and learning process. Researchers will observe the interaction between teachers and students during science learning using digital media, as well as its impact on class dynamics.(Assyakurrohim et al., 2022)

Results and Discussion

Use of Digital Media in Learning

Digital media has become an essential element in modern learning, especially since the COVID-19 pandemic accelerated the adoption of technology in schools. Digital media, such as online learning applications, interactive videos, and Learning Management System (LMS) platforms, provide opportunities for students to learn flexibly, independently, and interactively. In addition, digital media allows for learning differentiation, so that materials can be tailored to students' needs and abilities. According to recent research, the use of digital media can increase student engagement through visualization of abstract concepts and more immersive learning experiences.

However, its effectiveness depends on the competence of teachers in using the technology, adequate infrastructure, and students' readiness to adapt to new learning methods.(Muthmainnah et al., 2024). In this case, students expressed that they felt more involved in learning when using digital media, such as interactive learning applications, educational videos, and online quizzes. One student said, "I find it easier to understand science lessons because I can see pictures and animations that explain the material." Many students reported that digital media helped them to be more interested and reduce the boredom they often experience in conventional learning. Students felt more enthusiastic about participating in learning because of the fun interactive elements. In improving understanding of the material, most students felt that digital media made it easier for them to understand difficult concepts, especially in science learning which often involves abstract processes, such as the water cycle or the structure of the human body. One student expressed, *"With videos that I can replay, I can better understand the process of photosynthesis."* This shows that digital media provides opportunities for students to learn independently and repeat materials according to their needs. So too with ease of access and flexibility: Interviews also revealed that students felt more flexible in accessing learning materials anytime and anywhere. Students who were more introverted or who might feel shy to ask questions in class felt more comfortable exploring materials through digital media. One student said, "*I prefer studying at home via the app because no one is interrupting me and I can study at my own pace."* Teachers' Perceptions of Digital Media Effectiveness, Teachers stated that they saw a significant increase in student motivation and engagement since the use of digital media was implemented. One teacher stated, *"Students are more active in asking questions and discussing after they are given assignments using digital media. Previously, they tended to be passive in class."* ." Teachers also acknowledge that digital media makes it easier for them to explain difficult concepts, such as the solar system or food webs. The use of video and animation allows students to visualize concepts that were previously only explained through text.

During science lessons, students appeared more active and interested when using digital applications for learning. They worked in groups to complete interactive quizzes given by the teacher. Researchers noted that students who usually did not participate much in class discussions became more likely to give opinions or ask questions when using digital media. This shows that digital media successfully created a more inclusive atmosphere and allowed students to be more active in interacting in learning. In addition, observations also revealed that students used digital devices to access additional materials outside of class hours. Researchers noted several students who visited learning applications at home to review lessons or prepare for exams. This shows that digital media is not only used during class hours but also supports independent learning outside of class.(Mulyadi, 2023)

Increasing Student Learning Motivation

Learning motivation is a key factor that influences student success in the learning process. Digital media has the potential to increase student learning motivation through gamification, interactivity, and access to diverse learning resources.(Eka Melati, 2024) For example, the use of game-based applications can provide rewards and challenges that encourage students to actively learn. In addition, digital media allows for personalization of the learning experience, which can increase students' interest in the material. However, challenges such as digital distractions and imbalances in access to technology must be managed so that learning motivation does not decrease due to external factors. The results of interviews with 10 students showed a positive response pattern to digital media:

Among them Increased Interest in Learning: As many as 8 students admitted to being more enthusiastic about learning science with digital media than traditional methods. One student said, *"The animated videos helped me better understand scientific processes that were previously difficult to imagine".* More Enjoyable Learning Experience: 7 students mentioned that interactive features such as online quizzes and simulations made learning feel like playing while learning. Impact on Learning Habits: Students reported repeating material more often at home using digital media applications, such as online learning platforms or multimedia-based modules.

Digital media provides a different approach compared to conventional methods. Its interactivity, visualization, and flexibility change students' perceptions of the science subject to be more interesting and relevant. The results of teacher observations of student behavior show: Teachers noted that students asked questions and discussed more often when using digital media. This is different from conventional learning which tends to be passive. Students' attention span increased from an average of 15 minutes to 30 minutes per learning session, because this method provides a variety of activities.

Improving Science Learning Outcomes

Integration of digital media in learning Natural and Social Sciences (IPAS) can have a significant impact on improving learning outcomes. Media such as virtual laboratory simulations, scientific concept animations, and interactive experiments allow students to understand abstract concepts more concretely. Research shows that digital media-based learning can improve students' conceptual understanding, analytical skills, and creativity in IPAS. This is due to the ability of digital media to provide rich learning experiences, support problem-based learning, and encourage collaboration between students.(Indah & Fadilah, 2024).

The results of observations and in-depth interviews showed an increase in students' conceptual understanding of the science material after the implementation of the designed learning strategy. Based on class observations, students showed better ability in explaining the concepts of ecosystems, water cycles, and environmental impacts using their own language. This is reflected in: In group discussion sessions, 80% of students actively contributed, compared to 50% before the intervention, The results of formative tests showed an increase in the average score from 68 (before the intervention) to 85 (after the intervention), In practical activities, students were more skilled in identifying problems and formulating hypotheses. The results of interviews with teachers showed that students tended to be more independent in designing simple experiments. Observations and interviews with students showed a change in learning attitudes from passive to more proactive. As many as 75% of students stated that they were more motivated to learn science because of the interactive and relevant methods.

The interviewed teachers revealed that the implementation of inquiry-based learning strategies and the use of visual aids (eg infographics and short videos) were very effective in helping students understand complex material. Teachers felt that this strategy not only increased student engagement but also made it easier for them to teach difficult material. Several teachers admitted that they needed additional time to prepare innovative teaching materials.

Support from Teachers and Students for the Use of Digital Media

Teachers often view digital media as a tool that can improve the efficiency of science teaching. Teachers noted that digital media, such as simulations, interactive videos, and animations, help explain abstract concepts in science, such as the water cycle or the solar system, in a way that is easier for students to understand. Digital media tends to hold students' attention longer than traditional methods because of its visual and interactive nature. This has an impact on increasing student activeness in class discussions. However, in interviews, several teachers also said that the effectiveness of digital media is highly dependent on the readiness of teachers to use it. They felt that training in the use of educational technology should be more intensive to help them make the most of digital media. From interviews and surveys of students, the majority felt that digital media helped them understand the material better than conventional methods. The main reasons include: Students can re-access the material through digital platforms at any time, allowing for more flexible learning. Features such as interactive quizzes or simulations allow students to learn at their own pace, increasing their confidence in understanding concepts.(P. M. Sari et al., 2024)

Obstacles and Challenges in Implementing Digital Media

Technical Challenges

1) Internet Connection Issues

In many areas, especially in rural or remote areas, unstable internet connections are a major barrier to the use of digital media. This hinders students' and teachers' access to learning platforms.

2) Lack of Adequate Devices

Some students do not have devices such as laptops or tablets, which are often prerequisites for accessing digital learning media. This inequality creates gaps in learning outcomes.

3) Compatibility Issues

Teachers reported that some learning platforms are not always compatible with certain devices, creating technical barriers that take time to overcome..(Indriana, P. 2024)

Challenges of Teacher Motivation and Readiness

1) Lack of Technology Training:

Not all teachers have the skills to effectively integrate digital media into their lessons. Some have difficulty understanding new technologies or utilizing available features.

2) Changes in Teaching Patterns

Teachers who are used to conventional methods often need more time to adapt to digital media. This change sometimes causes a lack of confidence or discomfort.

3) Additional Workload:

The process of preparing digital-based materials takes longer, especially if teachers have to create their own multimedia content.(Aziz & Zakir, 2022).

Student Perceptions of Digital Media Use, Not all students feel comfortable with digital media. Some students stated that they find it easier to understand the material through direct interaction with teachers or peers. Students with basic technological limitations may feel frustrated when using digital media, reducing their motivation to learn. Digital media can be a double-edged sword; although engaging, students are often tempted to open other applications or sites during learning, reducing their focus.

Conclusion

The use of digital media in learning has great potential to improve the quality of education, especially in improving student learning motivation and learning outcomes, especially in science subjects. Digital media provides flexibility, interactivity, and access to diverse learning resources, which can increase student engagement and understanding. However, the effectiveness of its implementation is highly dependent on support from teachers and students, as well as the ability to overcome various obstacles such as limited infrastructure, lack of teacher digital competence, and inequality of access. Support from all parties, including the government, schools, and the community, is essential to creating an inclusive and effective digital learning environment.

Recommendations

1) The government and educational institutions must provide ongoing training for teachers to improve their skills in using digital media effectively in learning.
2) The government needs to expand access to the internet and digital devices, especially in remote areas, to reduce the digital divide in the education sector.
3) Policies are needed that support technology accessibility for students from low-income families, such as device subsidy programs or internet assistance.
4) Schools need to include digital literacy in the curriculum to ensure that students are able to use digital media effectively and responsibly.
5) Teachers and parents must guide students to use digital devices productively by setting clear rules for using technology during learning.
6) Schools, parents, and communities need to work together to support the integration of technology in education, ensuring its sustainability and effectiveness in the learning process

References

Assyakurrohim, D., Ikhram, D., Sirodj, R. A., & Afgani, M. W. (2022). Case Study Method in Qualitative Research. *Jurnal Pendidikan Sains Dan Komputer*, *3*(01), 1–9.

Aziz, A., & Zakir, S. (2022). *Indonesian Research Journal on Education : Jurnal Ilmu Pendidikan*. *2*(3), 1030–1037.

Dewi, M. S., Abidin, Y., & Arifin, M. H. (2024). Implementasi Media Pembelajaran Berbasis Peta Digital (Google Earth) dalam Mata Pelajaran IPS Materi Kenampakan Alam (Penelitian Quasi-Eksperiment pada Pembelajaran Ilmu Pengetahuan Sosial di Kelas V Sekolah Dasar). *Jurnal Pendidikan Tambusai*, *8*(1),

14182–14196. https://jptam.org/index.php/jptam/article/download/14389/11042

Eka Melati. (2024). Analisis Efektifitas Penggunaan Media Digital Dalam Pembelajaran Bahasa Inggris. *Jurnal Review Pendidikan Dan Pengajaran*, *7*, 7080–7087. http://journal.universitaspahlawan.ac.id/index.php/jrpp

Fatmasari, S., Aziz, I., & Hasyim, U. A. F. A. (2024). Scidac Plus Scidac Plus. *Berkala Ilmiah Pendidikan*, *4*(1), 28–34.

Fitria, E. (2014). Penerapan model. *Penerapan Model Beyond Centers and Circle Tme Sd Kelas Satu*, *10*(September), 179–188.

Indriana, P. (2024). Model Pembelajaran di Era Society 5.0 BAB. Model Pembelajaran Di Era Society, 5, 31

Indah, R. A., & Fadilah, M. (2024). Literature Review : Pengaruh Media Pembelajaran Literasi Visual Terhadap Hasil Belajar Biologi Siswa SMA. *Biodik*, *10*(2), 188–198. https://doi.org/10.22437/biodik.v10i2.33803

Khomsinuddin, Pangeran, G. B., Tamyiz, A., Wulandari, C. E., & Firdaus, F. A. (2024). Modernitas dan Lokalitas: Membangun Pendidikan Islam Berkelanjutan. *Journal of Education Research*, *5*(4), 4418–4428. https://jer.or.id/index.php/jer/article/view/1523

Maria Hermina Nona Lora, Sudarwati Nababan, Sukarman Hadi Jaya Putra, M. S. (2024). Pendampingan Membuat Media Pembelajaran Dengan Botol Bekas. *Communnity Development Journal*, *5*(4), 6589–6596.

Mulyadi, E. (2023). Penerapan PBL dalam Meningkatkan Aktivitas dan Prestasi Belajar Proyek IPAS di Sekolah Menengah Kejuruan. *Ideguru: Jurnal Karya Ilmiah Guru*, *8*(3), 653–660. https://doi.org/10.51169/ideguru.v8i3.684

Muthmainnah, N., Rahmayanti, V. A., & Faizin, M. (2024). Modernitas Alat Pendidikan Dalam Perspektif Artificial Intelligence Fenomena Kemajuan Zaman Pendidik Abad 21. *Pedagogi: Jurnal Ilmu Pendidikan*, *24*(1), 46–55. https://doi.org/10.24036/pedagogi.v24i1.1937

Sari, F. F. K., & Atmojo, I. R. W. (2021). Analisis Kebutuhan Bahan Ajar Digital Berbasis Flipbook untuk Memberdayakan Keterampilan Abad 21 Peserta Didik pada Pembelajaran IPA Sekolah Dasar. *Jurnal Basicedu*, *5*(6), 6079–6085. https://doi.org/10.31004/basicedu.v5i6.1715

Sari, P. M., Islam, U., Sumatera, N., Yusnaldi, E., Islam, U., Sumatera, N., Rambe, A. H., Islam, U., & Sumatera, N. (2024). *PENGARUH MEDIA PEMBELAJARAN BERBASIS ICT (INFORMATION AND COMMUNICATION TECHNOLOGY) TERHADAP MINAT BELAJAR SISWA KELAS IV PADA MATA PELAJARAN IPAS DI SDN 156 MAGA LOMBANG*. *1*(5), 96–108.

Suhelayanti, S., Syamsiah, Z., Rahmawati, I., Kunusa, W. R., Suleman, N., Nasbey, H., ... & Anzelina, D. (2023). Pembelajaran Ilmu Pengetahuan Alam dan Sosial (IPAS). Yayasan Kita Menulis..

Siswa, M., Pembelajaran, P., & Sd, I. P. A. (2024). *(Windhasari , 2013). Proses pembelajaran di kelas se…*. *01*(01), 1–28.

Ummah, M. S. (2019). Pengembangan Media Rumah Pelangi Dalam Meningkatkan Kemampuan Berhitung Anak Usia DiniTitle. *Sustainability (Switzerland)*, *11*(1), 1–14. http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_SISTEM_PEMBETUNGAN_TERPUSAT_STRATEGI_MELESTARI

Wijaya, S., Supena, A., & Yufiarti. (2023). Implementasi Program Pendidikan Inklusi Pada Sekolah Dasar di Kota Serang. *Jurnal Educatio FKIP UNMA*, *9*(1), 347–357. https://doi.org/10.31949/educatio.v9i1.4592

Wiliyanti, V., Buana, L. S. A., Haryati, Rusmayani, N. G. A. L., Dewi, K. A. K., & Novita, F. (2024). Analisis Penggunaan Media BerbasisTeknologi Dalam MeningkatkanMinat Belajar Mahasiswa. *Jurnal Review Pendidikan Dan Pengajaran*, *7*(3), 6790–6797. http://journal.universitaspahlawan.ac.id/index.php/jrpp

Author Information

Aan Nurhasanah
https://orcid.org/0000-0002-6498-2838
Kuningan University
Indonesia
Contact e-mail: *aan.nurhasanah@uniku.ac.id*

Eko Handoyo
https://orcid.org/0000-0003-1953-8233
Universitas Negeri Semarang
Indonesia

Arif Widiyatmoko
https://orcid.org/0000-0002-1111-1094
Universitas Negeri Semarang
Indonesia

Rusdarti Rusdarti
https://orcid.org/0009-0002-0522-2617
Universitas Negeri Semarang
Indonesia